

WHAT IS CLAIMED IS:

1. A method for array processing, the method comprising:

5 receiving a plurality of signals transmitting a symbol set;

determining a dominant signal set for each signal, the dominant signal set for a signal comprising a set of dominant signals that interfere with the signal;

10 constructing a trellis from the dominant signal sets, the trellis comprising a plurality of paths, each path representing a possible symbol set;

selecting an optimal path from the trellis; and

15 determining the symbol set represented by the optimal path.

2. The method of Claim 1, wherein determining the dominant signal set for each signal comprises:

determining energy that each signal receives from the other signals;

20 constructing a sparsity pattern from the energy; and

selecting the dominant signal sets from the sparsity pattern.

3. The method of Claim 1, wherein constructing the trellis from the dominant signal sets comprises:

associating a stage of the trellis with each signal;  
selecting a state set for each stage, the state set  
5 selected from the dominant signal set of the signal  
associated with the stage;

determining a plurality of value sets for each state  
set, each value set comprising a set of values for the  
state set; and

10 determining a plurality of transitions between the  
value sets, the paths of the trellis comprising at least  
some of the transitions.

4. The method of Claim 1, wherein constructing the  
15 trellis from the dominant signal sets comprises:

associating a state set with each signal, the state  
set selected from the dominant signal set of the signal;

determining a value set for each state set, the  
value set comprising a set of values for the state set;

20 and

determining the paths of the trellis from the value  
sets.

5. The method of Claim 1, wherein selecting the  
25 optimal path from the trellis comprises determining an  
optimal path according to an approximation of a maximum  
likelihood criterion.

6. The method of Claim 1, wherein selecting the optimal path from the trellis comprises:

associating each path with a cumulative cost; and  
determining the path with the lowest cumulative  
5 cost.

7. The method of Claim 1, wherein:

each path of the trellis comprises a plurality of transitions; and

10 selecting the optimal path from the trellis comprises:

calculating a transition cost for each transition; and

determining the path comprising the transitions  
15 with the lowest total transition cost.

8. A method for array processing, the method comprising:

receiving a plurality of signals transmitting a symbol set;

5 determining a dominant signal set for each signal, the dominant signal set for a signal comprising a set of dominant signals that interfere with the signal;

constructing a trellis from the dominant signal sets, comprising:

10 constructing a plurality of paths, each path representing a possible symbol set;

constructing a plurality of stages, each stage corresponding to a signal;

15 constructing a plurality of value sets associated with each stage; and

constructing a plurality of transitions, each transition going from a current value set to a next value set, each path of the trellis comprising at least some of the transitions;

20 selecting an optimal path from the trellis; and

determining the symbol set represented by the optimal path.

9. The method of Claim 8, wherein selecting the optimal path from the trellis comprises:

determining a set of survivor transitions for each stage;

5 calculating a transition cost for each survivor transition;

adding the transition cost of each survivor transition to a cumulative cost associated with the survivor transition; and

10 determining the optimal path from a survivor transition of a last stage corresponding to the lowest cumulative cost.

10. The method of Claim 8, wherein selecting the optimal path from the trellis comprises:

determining a set of survivor transitions for each stage by:

calculating a transition cost for each transition from the value sets of a current stage to a value set of a next stage;

20 determining a survivor transition with the lowest transition cost;

adding the transition cost of each survivor transition to a cumulative cost associated with the survivor transition; and

25 determining the optimal path from a survivor transition of a last stage corresponding to the lowest cumulative cost.

11. A system for array processing, the system comprising:

a plurality of antenna elements receiving a plurality of signals transmitting a symbol set;

5 a module set coupled to the antenna elements, the module set:

determining a dominant signal set for each signal, the dominant signal set for a signal comprising a set of dominant signals that interfere with the signal;

10 constructing a trellis from the dominant signal sets, the trellis comprising a plurality of paths, each path representing a possible symbol set;

selecting an optimal path from the trellis; and

15 determining the symbol set represented by the optimal path.

12. The system of Claim 11, wherein the module set determines the dominant signal set for each signal by:

20 determining energy that each signal receives from the other signals;

constructing a sparsity pattern from the energy; and

selecting the dominant signal sets from the sparsity pattern.

13. The system of Claim 11, wherein the module set constructs the trellis from the dominant signal sets by:

associating a stage of the trellis with each signal;  
selecting a state set for each stage, the state set  
5 selected from the dominant signal set of the signal associated with the stage;

determining a plurality of value sets for each state set, each value set comprising a set of values for the state set; and

10 determining a plurality of transitions between the value sets, the paths of the trellis comprising at least some of the transitions.

14. The system of Claim 11, wherein the module set  
15 constructs the trellis from the dominant signal sets by:

associating a state set with each signal, the state set selected from the dominant signal set of the signal;

determining a value set for each state set, the value set comprising a set of values for the state set;

20 and

determining the paths of the trellis from the value sets.

15. The system of Claim 11, wherein the module set  
25 selects the optimal path from the trellis by determining an optimal path according to an approximation of a maximum likelihood criterion.

16. The system of Claim 11, wherein the module set selects the optimal path from the trellis by:

associating each path with a cumulative cost; and  
determining the path with the lowest cumulative  
5 cost.

17. The system of Claim 11, wherein:

each path of the trellis comprises a plurality of transitions; and

10 the module set selects the optimal path from the trellis by:

calculating a transition cost for each transition; and

determining the path comprising the transitions  
15 with the lowest total transition cost.



18. A system for array processing, the system comprising:  
a plurality of antenna elements receiving a  
plurality of signals transmitting a symbol set;

a module set coupled to the antenna elements, the  
5 module set:

determining a dominant signal set for each  
signal, the dominant signal set for a signal comprising a  
set of dominant signals that interfere with the signal;

constructing a trellis from the dominant signal  
10 sets, the trellis comprising:

a plurality of paths, each path  
representing a possible symbol set;

a plurality of stages, each stage  
corresponding to a signal;

15 a plurality of value sets associated with  
each stage; and

a plurality of transitions, each  
transition going from a current value set to a next value  
set, each path of the trellis comprising at least some of  
20 the transitions;

selecting an optimal path from the trellis; and

determining the symbol set represented by the  
optimal path.

19. The system of Claim 18, wherein the module set selects the optimal path from the trellis by:

determining a set of survivor transitions for each stage;

5 calculating a transition cost for each survivor transition;

adding the transition cost of each survivor transition to a cumulative cost associated with the survivor transition; and

10 determining the optimal path from a survivor transition of a last stage corresponding to the lowest cumulative cost.

20. The system of Claim 18, wherein the module set selects the optimal path from the trellis by:

determining a set of survivor transitions for each stage by:

calculating a transition cost for each transition from the value sets of a current stage to a value set of a next stage;

determining a survivor transition with the lowest transition cost;

adding the transition cost of each survivor transition to a cumulative cost associated with the survivor transition; and

determining the optimal path from a survivor transition of a last stage corresponding to the lowest cumulative cost.

21. A method for array processing, the method comprising:

receiving a plurality of signals transmitting a symbol set;

5 determining a dominant signal set for each signal by:

determining energy that each signal receives from the other signals;

10 constructing a sparsity pattern from the energy; and

selecting the dominant signal sets from the sparsity pattern;

constructing a trellis comprising a plurality of paths from the dominant signal sets by:

15 associating a state set with each signal, the state set selected from the dominant signal set of the signal;

determining a value set for each state set, the value set comprising a set of values for the state set;

20 and

determining the paths of the trellis from the value sets, each path representing a possible symbol set;

selecting an optimal path from the trellis by:

25 determining a set of survivor transitions for each stage;

calculating a transition cost for each survivor transition;

30 adding the transition cost of each survivor transition to a cumulative cost associated with the survivor transition; and

determining the optimal path from a survivor transition of a last stage corresponding to the lowest cumulative cost; and

determining the symbol set represented by the  
5 optimal path.